

Risk Based Assessment

A fundamental consideration for plant operators is what, where, when and how to inspect to achieve the balance of statutory compliance and assured integrity - at affordable cost. Too little, too late means higher risk and probability of failure - and failure is expensive in terms of lost production revenue and the consequential impact of damaged reputation. Too much too soon means excessive cost; particularly in terms of disruption and resultant lost production revenue. The need for inspection is obvious and the reasons manifold. Very often the need is obligatory based upon the need to demonstrate quality and integrity. Sometimes it is a sensible precautionary measure which helps mitigate risk and underwrite integrity.



When used pro-actively, as an integrated source of plant condition information, it is a powerful management tool which enables more effective commercial management of vital assets, facilitates cost efficient production and maintenance scheduling and mitigates the probability and impact of failure.

At the point of manufacture, fabrication or construction all components and assemblies requires inspection to ensure 'as made' quality compliance with the regulations pertaining to safe and reliable use. Once in service these same products need periodic assessment to ensure that they continue to be fit for safe and reliable purpose.

But not everything can be inspected 100% on a regular basisand not everything needs to be!

Those parts which are not critical can be tested less frequently - particularly those which are not exposed to conditions which are likely to incur serious problems, those which have minimal impact in terms of safety and productivity and those which are routinely serviceable or replaceable. More significantly, most defects are predictable in terms of their probable cause, nature, location and integrity impact.

This risk & probability based assessment approach helps determine what should be inspected, where the focus of attention should be and what to look for - but the question remains when and at what frequency should inspection be performed.

On the question of affordability a further consideration has to be made to establish the differential between getting it right and the consequential cost of getting it wrong. Exercising this judgement requires a good understanding of the factors affecting condition, actual condition and the probability and consequence of failure. NDT provides answers to these questions.

Risk Based Inspection (RBI) is term coined in the 1990's in an attempt to define a more systematic and predictive means of assessing and classifying the criticality of plant with respect to probability and impact of failure. The strategy is not restricted to safety and can embrace other criteria such as availability, priority and viability of production assets, as a precursor to more effective production scheduling and maintenance planning.

As an inspection service provider we firmly believe that NDT is an important asset management tool which, if used appropriately, can help reduce risk, increase awareness and improve confidence. We also believe that the improved awareness afforded by more meaningful information of plant condition can yield significant savings in terms of increased availability, reduced engineering costs and more cost effective shut down & maintenance scheduling.

Although we are not Plant Engineers we do have an extensive knowledge of material degradation mechanisms and defect types. By working closely with our clients, their engineering advisors and insurers, we are able to use RBI to focus on the task at hand and ensure that we apply the most appropriate techniques based upon an awareness of the factors and conditions which affect integrity. This approach also enables our clients to better appreciate the pros and cons of the various techniques available and the impact they may have on their schedules and their budgets.

When to Inspect?

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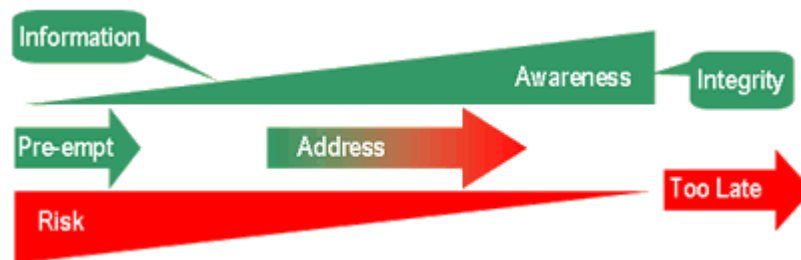
By definition, statutory inspection must be done at the ordained points in time.

Where no such mandatory obligations exist, the question of when (or how frequently) is open to judgement based on a number of key parameters which can best be described as sensible, safe and affordable.

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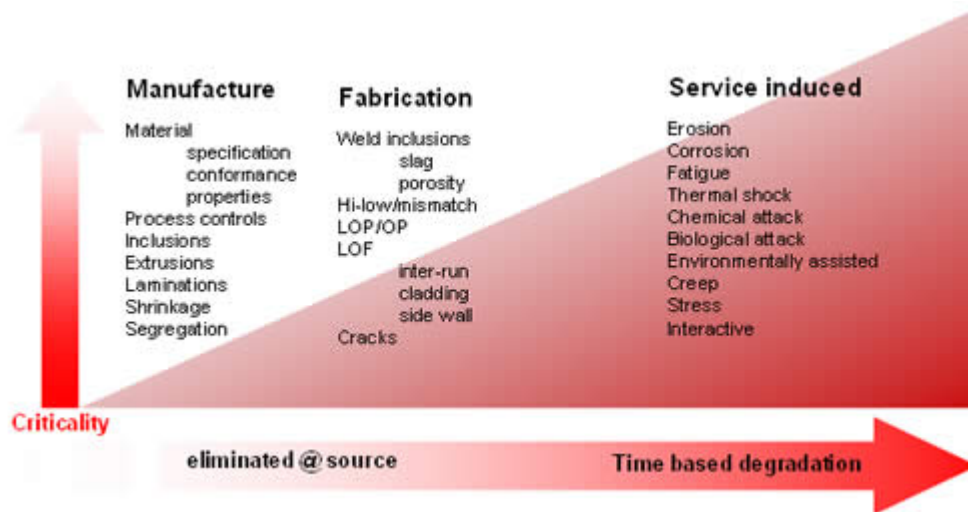


What to Inspect?

Statutory obligations aside, the focus of attention must be on those items of plant which are critical in terms of safety, susceptibility, functionality and sustainability in terms of maintenance, repair or replacement.

In making these considerations it should be recognized that manufacturing defects should be eliminated at source and those which remain are those falling within acceptance limits and generally less integrity critical.

It should also be recognized that susceptibility to degradation and ultimate failure is often a time based function which can be initiated and accelerated by process conditions and environmental factors.



This Risk Based Inspection concept can also be used to determine where to focus attention and of equal importance, where not to squander valuable effort in areas not prone to failure or a low impact and risk.

Why Shut down?

We firmly believe that 'shut down' is the least appropriate time to establish the condition of plant 'in service' and arguably the most expensive in terms of direct cost and the financial consequences of unearthing problems when it is too late in the day to procure or implement cost effective corrective action.

We are also convinced that sufficient non-invasive inspection techniques exist to enable the vast majority of condition assessment to be performed in a non-disruptive and pre-emptive fashion whilst plant is on-stream.

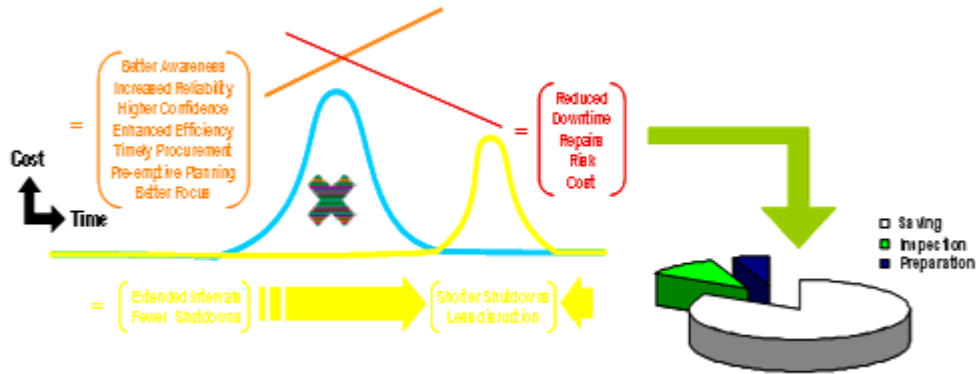
In simple terms, we believe that the wrong time to inspect is when its -

- Too late - to effect remedial action
- Too disruptive - with respect to necessary engineering work priorities
- Inadequate time - to assess the condition of critical items
- Wrong conditions - to do this effectively & reliably
- Not cost effective - due to work intensity, priorities & scheduling.

We also believe that shutdown inspection focus should be on -

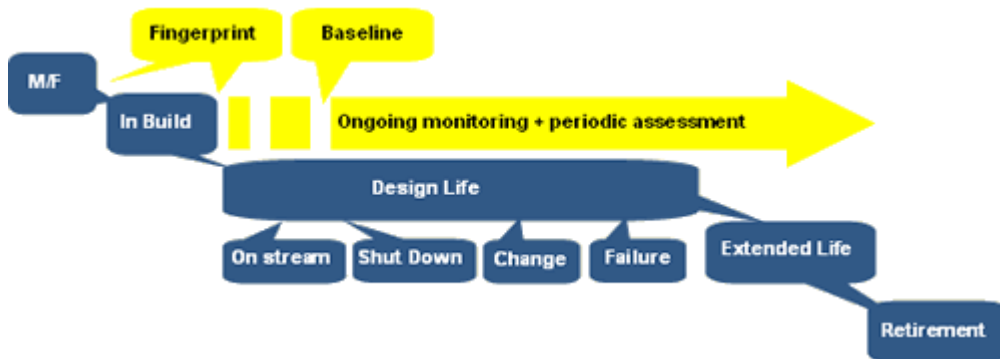
- Those items which can only be inspected by direct access, e.g. tube bundles
- Where access (staging) is facilitated through other work
- When more detailed scrutiny is called for & convenient to perform.

Properly scheduled Risk Based Inspection using NII techniques reduces the frequency, scale and cost impact of shutdown and enables –

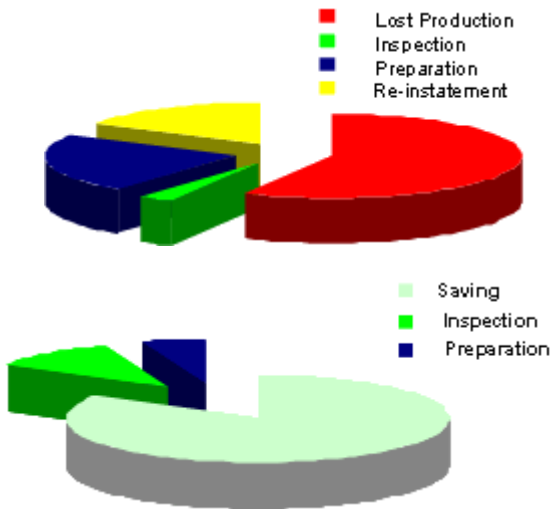


What does it cost?

The need for inspection, as a means of determining asset condition and mitigating risk, applies at all stages of product and plant life. Clearly this need is greatest when susceptibility and impact is high and often increases with time as service effects take their toll.



But 'time is money' and 'down time is serious money'. This applies irrespective of whether it is planned or attributable to unscheduled outage. If downtime, and the consequential impact of failure, can be minimized or avoided - the benefits are obvious.



Traditional invasive methods of inspection are disruptive, ineffective & expensive in terms of 'access' engineering support and degradation issues are complex & require appropriate detection, quantification & characterisation methods using appropriate technique.

The development of non-invasive methods means that many inspection tasks can now be performed at any time without any disruption to operations. Many of these techniques can be applied remotely and at elevated temperature - so negating the need for 'shut down'.

This means that inspection can be used as a pre-emptive tool rather than something reserved for 'shut down' when it is often too late to effect remedial action, most disruptive and least cost effective. The cost impact of this established practise is enormous. The actual cost of inspection represents just a few percent of total expenditure and the vast majority of costs are consumed by lost production revenue and implementation expenditure.

NII techniques helps reduce direct expenditure and avoid disruptive intervention & downtime losses. The approach, which is RBI compatible and increasingly accepted by regulators, certifiers and insurers, also offers other advantages -

- Requires access to one side only
- Can be applied on stream and at elevated temperature
- Some methods can be applied through insulation
- Can be performed without expensive access measures
- Improved POD by selective use of appropriate techniques
- Comprehensive statement of through wall condition
- Fast, efficient & comprehensive coverage
- Graphical (digital) evidence of coverage and findings

The range of non-invasive techniques we provide include all surface and near surface techniques such as visual/video, dye penetrant, magnetic particle and electro-magnetic/eddy current testing and volumetric ultrasonic and radiographic ultrasonic methods which enable visualization assessment of through wall condition.

The ultrasonic techniques include advanced digital methods such as TOFD, phased array - many of which are automated and can be remotely deployed. All site radiography is performed using inherently safe and logistically efficient methods.